

On-Demand Special Use Airspace

Metron Aviation, Inc.**Technical Abstract**

We design and develop a Decision Support Tool (DST) that supports On-Demand Special Use Airspace (SUA) scheduling and flight plan optimization around SUA between Airline Operations Control (AOC), Military, Air Traffic Control System Command Center (ATCSCC), and Air Route Traffic Control Center (ARTCC) personnel. The tool allows AOC and ARTCC Traffic Management Unit (TMU) personnel to coordinate strategic and tactical plans, with a strategic look ahead time from days to less than 2 hours, and tactical plans up to the minute centered locally around an ARTCC airspace. The tool coordinates aircraft movement though vs around SUA. The tool allows for asynchronous communication of priorities associated with flight plans and flight plan amendments (contingency plans) between the AOC and ARTCC TMU specialist, allowing the ATCSCC and Military to view these priorities and TMU responses to them at any time. This technology will be developed to Technology Readiness Level (TRL) 2 at the end of Phase I, and TRL 4 prototype system by the end of Phase II.

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Trajectory Design to Benefit Trajectory-Based Surface Operations

Optimal Synthesis, Inc.**Technical Abstract**

Trajectory-based operations constitute a key mechanism considered by the Joint Planning and Development Office (JPDO) for managing traffic in high-density or high-complexity airspace in the Next-Generation Air Transportation System (NextGen). With this concept applied to surface operations at major airports, NASA's NextGen-Airportal Project is exploring the use of surface 4-dimensional (4D) trajectories, which use required times of arrival (RTAs) at selected locations along the route. Observing these RTAs as constraints along the taxi route, the flight still has many degrees of freedom in adjusting its state profiles (i.e., position, velocity, etc. as functions of time) to achieve the timing constraints. This research will investigate whether and how these degrees of freedom in trajectory control may be used to achieve desirable behaviors for the taxi operations. Previous research has applied the trajectory control freedom to assure passenger comfort by keeping the accelerations and decelerations within pre-specified limits, and yet there is still untapped flexibility in designing the trajectories. The proposed research will explore this trajectory design problem to achieve additional desirable behaviors, beginning with the consideration of fuel burn, emissions, and noise. A flight-deck automation experimental prototype will provide the platform for simulating the designs, augmented by models developed to evaluate environmental benefits. The findings will benefit future designs of flight-deck automation systems, as well as tower automation systems which rely on accurate understanding of the flight deck's operational behaviors to plan efficient and safe operations for the entire surface traffic.

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